REMARKS

New claim 50 more particularly defines the applicants' preferred embodiment, as shown for example in FIG. 3 (specification page 14 lines 5-26), and defined in claims 8, 9, 15, and 16 as filed.

In response to the Notice of Draftsperson's Patent Drawing Review, please note that formal drawings were submitted with applicants' Preliminary Amendment filed Sept. 6, 2001.

The present invention relates to a file server system providing direct data sharing between clients with a server acting as an arbiter and coordinator. For example, as shown in applicants' FIG. 3, a file server 60 including a data mover 61 and a cached disk array 63 provides direct data sharing between network clients 64, 65 by arbitrating and coordinating data access requests. The data mover 61 grants file lock requests from the clients 64, 65 and also provides metadata to the clients 64, 65 so that the clients can access data storage 62 in the cached disk array 63 over a data path that bypasses the data mover 61. (Applicants' specification, page 55, lines 18-23.)

On page 2, paragraph 3 of the Official Action, claims 1-5, 8, 11, 14-18, 27, 30, 33-34, 42, and 44-48 were rejected under 35 U.S.C. 103(a) as being unpatentable over Bennett et al. (U.S. Patent No. 5,852,747) (hereinafter Bennett) in view of Tzelnic et al. (U.S. Patent 5,944,789) (hereinafter Tzelnic). Applicants respectfully traverse.

The policy of the Patent and Trademark Office has been to follow in each and every case the standard of patentability enunciated by the Supreme Court in Graham v. John Deere Co., 148 U.S.P.Q. 459 (1966). M.P.E.P. § 2141. As stated by the Supreme Court:

> Under § 103, the scope and content of the prior art are to be determined; differences between the prior art and the claims at issue are to be ascertained; and the level of ordinary skill in the pertinent art resolved. Against this background, the obviousness or nonobviousness of the subject matter is determined. Such secondary considerations as commercial success, long felt but unsolved needs, failure of others, etc., might be utilized to give light to the circumstances surrounding the origin of the subject matter sought to be patented. As indicia of obviousness or nonobviousness, these inquiries may have relevancy.

148 U.S.P.Q. at 467.

The problem that the inventor is trying to solve must be considered in determining whether or not the invention would have been obvious. The invention as a whole embraces the structure, properties and problems it solves. In re Wright, 848 F.2d 1216, 1219, 6 U.S.P.Q.2d 1959, 1961 (Fed. Cir. 1988).

Bennett discloses a client/server computer system that manages shared files. A client includes a data cache and an associated cache manager, and executes a client application that requests data from a shared file. If the data is not currently stored in the cache, the client cache manager sends to the server a request for multiple consecutive blocks of data beginning with the first block containing the data requested by the client from the shared file. The server includes a token manager which receives the request, and in response (a) awards the token for a first data block specified in the request regardless of contention for the first data block and (b) awards tokens for multiple blocks held by a client who also holds the token for the first block. (Bennett, Abstract.)

With reference to applicants' claim 1, Bennett discloses a method of operating a file system in a data network, the method comprising; (a) the file server receiving a request for metadata about a file to be accessed, the request being received from a data processing device (i.e., a client) in the data network (Bennett, column 4, lines 4-7 and 23-28); and (b) in response to

the request for metadata, the file server granting to the data processing device a lock (i.e., a token) on at least a portion of the file (at least the first data block; see Bennett, Abstract, lines 11-22) and returning to the data processing device metadata of the file (e.g., Bennett, column 4, lines 25-27).

Tzelnic discloses a network file server maintaining local caches of file directory information in data mover computers. The data mover computers link a cached disk array to a data network for file access. Each data mover computer maintains a local cache of file directory information including locking information of locked files that are accessible through the data mover. A cache consistency scheme ensures that shared locking information is consistent in the local caches. The file directory information in the local cache includes information mapping file names to a list of logical blocks for each file name, file attributes that affect data access, and locking information down to a block level of granularity.

With reference to claim 1, Tzelnic, column 15, lines 44-56, say:

> NFS Version 2 has synchronous writes. When a client wants to write, it sends a string of write requests to the server. Each write request specifies the client sending the data to be written, a file identifier, and an offset into the file specifying where to begin the writing of the data. For each write request, the server writes data and attributes to disk before returning to the client an acknowledgement of completion of the write request. (The attributes include the size of the file, the client owning the file, the time the file was last modified, and pointers to the locations on the disk where the new data resides.) This synchronous write operation is very slow, because the server has to wait for disk I/O before beginning the next write request.

With respect to the differences between the applicants' claim 1 and the cited art, the Official Action, page 3, paragraph 4, recognizes: "Bennett does not disclose the metadata of the

file including information specifying data storage locations in the file server for storing data of the file." The Official Action further says that Tzelnic discloses this limitation (citing Tzelnic e.g. col. 15, lines 53-54). However, it is not seen where Tzelnic discloses that Bennett's kind of file metadata would include information specifying data storage locations in the file server for storing data of the file. Nor is it seen where Tzelnic or Bennett discloses or suggests that information specifying data storage locations in the file server for storing data of the file should be returned by the file server to a data processing device in the data network in response to a request from the data processing device to the file server for metadata about the file. For example, Tzelnic column 2 lines 26-30 say:

> The file directory information in the local cache includes mapping information mapping file names to a list of logical blocks for each file name, file attributes that affect data access, and locking information down to a block level of granularity.

A comparison of this file directory information of Tzelnic with the metadata returned by the server to the client in Bennett (i.e., file identification, file size, file type, date of last change, etc.) would lead one to conclude that Bennett's metadata correspond to Tzelnic's file attributes that affect data access (size of the file, client owning the file, and time the file was last modified). One would also conclude that Bennett's metadata is different from Tzelnic's mapping information mapping file names to a list of logical blocks for each file name, and locking information down to a block level of granularity. These conclusions are consistent with Bennett's statement in column 1, line 27 ("The control information is also known as 'metadata'.)

and consistent with the fact that Bennett refers to "a token associated with metadata" in column 4, line 27, indicating that the token (i.e., the lock) is different from Bennett's metadata.

On page 3, paragraph 4, the Official Action concludes: "At the time the invention was made, it would have been obvious to a person skill[ed] in the art to combine Bennett and Tzelnic because specified data storage location makes communication faster and more efficient for client to access data inside the data storage." The applicants respectfully disagree. It is not seen where the prior art suggests a desirability of combining Bennett and Tzelnic and modifying that combination in a fashion required to reconstruct the applicants' invention of claim 1.

Hindsight reconstruction, using the applicant's specification itself as a guide, is improper because it fails to consider the subject matter of the invention "as a whole" and fails to consider the invention as of the date at which the invention was made. [T]here must be some motivation, suggestion, or teaching of the desirability of making the specific combination that was made by the applicant." In re Lee, 277 F.3d 1338, 1343, 61 U.S.P.Q.2d 1430, 1435 (Fed. Cir. 2002) (quoting In re Dance, 160 F.3d 1339, 1343, 48 U.S.P.Q.2d 1635, 1637 (Fed. Cir. 1998)). "[T]eachings of references can be combined only if there is some suggestion or incentive to do so." In re Fine, 837 F.2d 1071, 1075, 5 U.S.P.Q.2d 1596, 1600 (Fed. Cir. 1988) (Emphasis in original) (quoting ACS Hosp. Sys., Inc. v. Montefiore Hosp., 732 F.2d 1572, 1577, 221 U.S.P.Q. 929, 933 (Fed. Cir. 1984)). "[P]articular findings must be made as to the reason the skilled artisan, with no knowledge of the claimed invention, would have selected these components for combination in the manner claimed." In re Kotzab, 217 F.3d 1365, 1371, 55 U.S.P.Q.2d 1313, 1317 (Fed. Cir. 2000). See, for example, Fromson v. Advance Offset Plate, Inc., 755 F.2d 1549, 1556, 225 U.S.P.Q. 26, 31 (Fed. Cir. 1985) (nothing of record plainly indicated that it would have

been obvious to combine previously separate lithography steps into one process); In re Gordon et al., 733 F.2d 900, 902, 221 U.S.P.Q. 1125, 1127 (Fed. Cir. 1984) (mere fact that prior art could be modified by turning apparatus upside down does not make modification obvious unless prior art suggests desirability of modification); Ex Parte Kaiser, 194 U.S.P.Q. 47, 48 (PTO Bd. of Appeals 1975) (Examiner's failure to indicate anywhere in the record his reason for finding alteration of reference to be obvious militates against rejection).

With respect to applicants' claim 1, a pertinent issue is whether or not the prior art provides some motivation, teaching or suggestion that "information specifying data storage locations in the file server for storing data of the file" should be returned by the server of Bennett to a client in response to a request from the client for metadata about a file to be accessed. As discussed above, neither Bennett nor Tzelnic provides such a motivation, teaching or suggestion. The Official Action suggests that the proposed combination and alteration of the references would make communication faster and more efficient for a client to access data inside the data storage. However, such a motivation is improper hindsight unless it is found in the prior art as a whole apart from the teaching in applicants' novel disclosure. Moreover, the applicants' specification, page 17, lines 1-10, teach that use of the invention is desirable only under particular circumstances:

> Whenever a client has a bypass data path to a file system and can therefore send data access commands to the file system without passing through a data mover computer, the client can potentially access all of the files in the file system. In this situation, the client must be trusted to access only the data in a file over which the client has been granted a lock by the data mover that owns the file system to be accessed. Therefore, the methods of client access as described above with reference to FIGS. 2 and 3 have a security risk that may not be acceptable for clients located in relatively open regions of the data network. The method of

> client access as described above with reference to FIG. 3 also requires special client software, in contrast to the methods of client access as described above with reference to FIGS. 1-2 which can use standard client software.

Absent some clear teaching in the prior art, it is not understood why a person of ordinary skill would have any motivation to modify the file server of Bennett to respond to a request for metadata about a file to be accessed by returning to the client file information other than the file attributes that were used by the client for controlling access of a client process to the file through the file server (i.e., Bennett's metadata, including file identification, file size, file type, date of last change, etc.). Tzelnic's information mapping file names to a list of logical blocks for each file name need only be used internally by the file server, and release of this file mapping information to the clients leads to a security risk. Because Tzelnic included neither a suggestion of a desirability to release the file mapping information to the clients nor a way for the clients to use the file mapping information, it is not seen how a person of ordinary skill would have been motivated to overcome the desire to maintain the security of the file mapping information within the file server.

With respect to claim 4, page 4, paragraph 7 of the Official Action cites Bennett e.g. column 4, line 30-38 for a disclosure that the data processing device modifies (updates) metadata from the file server and also recognizes that Bennett does not disclose that the data processing device writes data to the data storage locations in the file server. Hence, the data processing device (client) of Bennett is not modifying the metadata from the file server "in accordance with the data storage locations in the file server to which the data is written."

The Official action cites Tzelnic, column 15, lines 44-48, which say: "When a client wants to write, it sends a string of write requests to the server. Each write request specifies the client sending the data to be written, a file identifier, and an offset into the file specifying where to begin the writing of the data." However, this disclosure of Tzelnic is a case of the data processing device (e.g., the client) requesting the data mover to write to the file, and the data mover mapping the logical addresses of the file to the data storage locations in the file server. The Official Action proposes to combine this disclosure of Bennett with this disclosure of Tzelnic to reconstruct claim 4, but it is not understood how the entirety of the subject matter of claim 4 results from this combination.

In a conventional file server, or the file server of Tzelnic, it is the file server that is mapping the file to the storage locations, and modifying the metadata of the file when needed in accordance with the data storage locations in the file server to which the data mover is written. Claim 4 as a whole is specifying instead that the data processing device is writing data <u>to the data storage locations</u> in the file server, and modifying the metadata from the file server <u>in accordance with the data storage locations in the file server to which the data is written</u>. In short, the data processing device (e.g., the client) is performing operations previously performed by the file server.

With respect to claim 5, the Official Action, page 5, paragraph 8, cites Tzelnic, column 16, lines 55-59, which say:

> For example, all of the data and attributes written to the storage layer 212 are written to the buffer cache 213, and then the file data 219 in the buffer cache 213 are written to the disk 215 before the file attributes 220 are written to the disk 215.

It is not understood how this passage discloses that the data processing device (i.e., the client) sends the modified metadata to the file server after the data processing device writes the data to the data storage of the file server. In Tzelnic, it is the data mover of the file server that writes the data to the storage of the file server, modifies the metadata as required for a write operation, and writes this modified metadata to storage of the file server.

With reference to claim 8, Bennett (and the combination of Bennett and Tzelnic) has been distinguished above with reference to the recitations in claim 8 that are similar to the recitations in claims 1 and 4. In particular, it is not seen where the cited passages of Bennett disclose the file server sending to the client "information specifying data storage locations in the file server for storing data of the file", nor the client producing a data access command from the metadata for accessing these data storage locations in the file server. Instead, the passages refer to access of logical blocks of a file rather than data storage locations. For example, Bennett col. 4, lines 39-50 say:

> After opening the file, the client application 42 may request to read or write specific bytes of actual data in a specified file. The client application references the bytes relative to the beginning of the file. For example, the client application may request the first 1K bytes of the file, and specify the location of an application buffer to receive these bytes for reading or supply the bytes for writing. In response, the command processor 40 determines which logical 4K byte block(s) contains the requested bytes, for example, the first 4K byte block. This determination is based on a simple division of the file length into 4K blocks and calculating in which block(s) the requested byte range falls.

In this example, for the client to read or write specific bytes of actual data in a specified file, the client application references the bytes relative to the beginning of the file and simply calculates what 4K logical block in the file contains the desired bytes.

With reference to claims 15 and 16, these claims include recitations similar to the recitations of claims 4 and 5, and therefore Bennett and Tzelnic are distinguished for the reasons discussed above with respect to claims 4 and 5.

With reference to claim 17, page 6, paragraph 13 of the Official Action cites Tzelnic column 15, lines 57-67, which say:

> NFS Version 3 has asynchronous writes. In the asynchronous write protocol, the client sends a string of write requests to the server. For each write request, the server does a "fast write" to random access memory, and returns to the client an acknowledgment of completion before writing attributes and data to the disk. At some point, the client may send a commit request to the server. In response to the commit request, the server checks whether all of the preceding data and attributes are written to disk, and once all of the preceding data and attributes are written to disk, the server returns to the client an acknowledgement of completion.

It is not understood how this passage of Tzelnic discloses that <u>the client</u> sends the modified metadata to the file server in response to a commit request from an application process of the client. Instead, in Tzelnic, it is the data mover of the file server that modifies the metadata as required for write operations, and writes this modified metadata to storage of the file server in response to a commit request from the client.

With reference to claim 18, page 6, paragraph 14 of the Official Action cites Tzelnic column 17, lines 18-25, which say:

> One particular kind of commit request is a request to close the file, indicating that read-write access of the file is finished. After step 246, in step 247, execution branches depending on whether the last commit request was a request to close the file. If not, execution loops back to step 242. If so, execution continues to step 248. In step 248, the write lock on the file is released to close the file, and the read-write file access task is finished.

It is not understood how this passage of Tzelnic discloses that the client sends the modified metadata to the file server when the client requests the file server to close the file. Instead, in Tzelnic, it is the data mover of the file server that modifies the metadata as required for write operations, and writes this modified metadata to storage of the file server when the client requests the file server to close the file.

With reference to claim 27, see the remarks above with respect to claim 1.

With reference to claim 34, see the remarks above with respect to claim 4.

With reference to claim 42, see the remarks above with respect to claim 8.

With reference to claim 45, see the remarks above with respect to claim 4.

With reference to claim 46, see the remarks above with respect to claim 5.

With reference to claim 47, see the remarks above with respect to claim 17.

With reference to claim 48, see the remarks above with respect to claim 18.

On page 7, paragraph 16 of the Official Action, claims 6, 7, 19, 20, 35, and 49 were rejected under 35 U.S.C. 103(a) as being unpatentable over Bennett in view of Tzelnic and further in view of He (U.S. Patent No. 5,734,898). Applicants respectfully traverse. As discussed above, the base claims 1, 8, 27, and 42 have been distinguished with respect to the combination of Bennett and Tzelnic. He fails to provide the required disclosure and motivation that is absent from Bennett and Tzelnic.

He discloses a data processing network including clients and a server, in which the clients have respective client caches (FIG. 1). After a client has updated an object in its cache, the client sends an ID and contents of the updated object to the server. Then, the client sets the version of its object to 0, and starts other processing without waiting for completion of the update in the server. Upon receiving an update request from the client, the server places an update lock on the object and updates the object in server cache. Then, the server returns no response to this operation. When the transaction is committed, the server uses the updated contents to update its own disk and sends the version at the server to the client. (He, Abstract.)

It is not seen how He can provide a motivation to combine and modify Bennett and Tzelnic to reconstruct applicants' invention because He provides an alternative method of enhancing system performance; namely, a client object cache instead of direct client access to data storage locations in the file server as specified by metadata provided by the file server to the client. The applicants' claims 6, 7, 19, 20, 35, and 49 further define that the data processing device (e.g., the client) has a cache memory for caching the metadata of the file, which is defined in the base claims as including information specifying data storage locations in the file server for storing data of the file.

On page 8, paragraph 20 of the Official Action, claims 12, 13, 31, 32, and 43 were rejected under 35 U.S.C. 103(a) as being unpatentable over Bennett in view of Tzelnic, and further in view of Henson et al. (U.S. Patent No. 5,226,159). Applicants respectfully traverse. As discussed above, the base claims 8, 27, and 42 have been distinguished with respect to the combination of Bennett and Tzelnic. Henson fails to provide the required disclosure and motivation that is absent from Bennett and Tzelnic.

Henson discloses a distributed data processing system and method in which locks on a file are supported by a data structure that resides either on a client machine or on the file's server. When only a single client's processes are locking a file, the data structure can reside on that client. Whenever a plurality of client machines attempt to place locks on a file, the data structure is moved to the server; this forces the clients locking the file to communicate with the server when performing lock operations. (Henson, Abstract, lines 1-9.)

Claims 12 and 31 distinguish Henson by defining that there are two different locks with respect to the same file; namely, a lock on at least a portion of the file granted by the file server, and a local file lock granted by a lock manager of the client. The lock granted by the file server to the client is not granted to any particular application process of the client. The local file lock granted by the lock manager of the client is granted to a process of the client. In effect, the applicants' claims 12 and 31 define a hierarchy of locks. In contrast, Henson has one locking data structure that resides either on a client or on the server, and that data structure grants locks to particular client processes. (See Henson et al. FIG. 4 and column 8, lines 48-52; compare Henson col. 3, lines 24-30.)

On page 9, paragraph 24 of the Official Action, claims 9, 10, 21-24, 28, 29, and 36-39 were rejected under 35 U.S.C. 103(a) as being unpatentable over Bennett in view of Tzelnic, and further in view of Pittenger et al., U.S. Patent 5,541,925 (hereinafter Pittenger). Applicants respectfully traverse. As discussed above, the base claims 8 and 27 have been distinguished with respect to the combination of Bennett and Tzelnic, and Pittenger fails to provide the required disclosure and motivation that is absent from Bennett and Tzelnic.

Pittenger discloses a point of sale system that bypasses the public telephone network. The system provides communication between a point of sale (POS) terminal and a destination host, which may be a credit transaction authorization entity. The system includes the POS terminal, an RF network port, a packet switched network, a destination node, and a destination host. The system eliminates dependence on the public telephone network by using a radio frequency link rather than a public telephone network to access the packet switched network.

With reference to claim 9, page 9, paragraph 25 of the Official Action recognizes that Bennett and Tzelnic fail to disclose that the client sends the data access command to the data storage device over a data transmission path that bypasses the data mover computer. The Official Action cites Pittenger col. 1, lines 28-30 and col. 3, lines 7-15. Pittenger col. 1, lines 26-30 say:

> When conventional networks are used for a POS transaction, steps performed in effecting the transaction are as follows: First, the originating POS terminal dials a port on a public telephone network ("PTN"), thus accessing the originating node in a packet switched network ("PSN").

Pittenger col. 3, lines 7-15, say:

> The present invention eliminates dependence on the PTN by using an RF link rather than a PTN to access the PSN. Thus, a call request and point of sale transaction information are sent to the PSN via the RF link. The originating node at the RF link assembles a POS Data packet, which includes all transaction data, prior to sending a Call Request packet to the destination node, thus eliminating handshake steps and reducing the duration of PSN use.

It is not seen where these or any other passages of Pittenger disclose a client sending a data access command to the data storage device over a data transmission path that bypasses the data mover computer. Pittenger deals with eliminating the public telephone network from his system, rather than bypassing part of his system. More importantly, it is not seen how a point of sale system that bypasses the public telephone network is pertinent to a file server system.

For the teachings of a reference to be prior art under 35 U.S.C. §103, there must be some basis for concluding that the reference would have been considered by one skilled in the particular art working on the particular problem with which the invention pertains. In re Horne, 203 U.S.P.Q. 969, 971 (C.C.P.A. 1979). Non-analogous art cannot properly be pertinent prior art under 35 U.S.C. §103. In re Pagliaro, 210 U.S.P.Q. 888, 892 (C.C.P.A. 1981). As explained in In re Clay, 966 F.2d 656, 659, 23 U.S.P.Q.2d 1058, 1060-61 (Fed. Cir. 1992):

> Two criteria have evolved for determining whether prior art is analogous: (1) whether the art is from the same field of endeavor, regardless of the problem addressed, and (2) if the reference is not within the field of the inventor's endeavor, whether the reference still is reasonably pertinent to the particular problem with which the inventor attempts to solve...
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> ***
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> A reference is reasonably pertinent if, even though it may be in a different field from the inventor's endeavor, it is one which, because of the matter with which it deals, logically would have commended itself to an inventor's attention in considering his problem. Thus, the purposes of both the invention and the prior art are important in determining whether the reference is reasonably pertinent to the problem the invention attempts to solve.

In the present case, the invention relates to the field of data storage, and Pittenger relates to a different field of a point of sale system. The purpose of the invention is to reduce data

access time of a client to data storage in a file server system. The purpose of Pittenger is to eliminate dependence of a point of sale system on the public telephone network. Due to the different field of endeavor and the different purpose, it is not seen why the subject matter of Pittenger logically would have commended itself to the inventor's attention when considering the problem of reducing data access time of a client to data storage in a file server system.

Even if Pittenger were considered to be analogous art, there must be some motivation, suggestion, or teaching in the prior art of the desirability of making the specific combination that was made by the applicant. In re Lee, supra. Due to the differences between a point of sale system as in Pittenger and a file server as in Bennett or Tzelnic, it is not apparent why one of ordinary skill would have been motivated to enable a client to bypass the data mover of a file server to access directly the storage locations of the file server.

Claims 10, 21, 28, and 36 are distinguished from Tzelnic and Pittenger for the same reasons given above with respect to claim 9.

On page 10, paragraph 29 of the Official Action, claims 25, 26, 40, and 41 were rejected as being unpatentable over Bennett in view of Tzelnic, and further in view of Pittenger. Applicants respectfully traverse. The combination of Bennett, Tzelnic, and Pittenger has been distinguished above with respect to the base claims 21, 36 and 38.

In view of the above, reconsideration is respectfully requested, and early allowance is earnestly solicited.

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APPENDIX I. Version with Markings to Show Changes Made.

A new claim 50 has been added.